(12) **UK Patent Application** (19) **GB** (11) **2 253 325** (13) **A**

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(54) **Video graphics generator for an amusement machine**

(57) A video graphics generator is provided for an amusement machine which is operable in a first, "attract", mode and a second, play, mode and which includes a video display device, user operable play select means and a machine controller operable in both the first mode and, in response to activation of the play select means, in the second mode to output video signals for driving the display device. The video graphics generator comprises programmable means responsive to operation of the amusement machine in the first mode to interrupt the video signals output by the machine controller for a predetermined interval and to substitute alternative video signals e.g. advertisements for display on the video display device during the interval. The video graphics generator is preferably in the form of an add-on unit for an existing amusement machine, but could be incorporated as an integral part of such a machine.

FIG2.

GB 2 253 325 A

FIG 1

FIG2

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        ┌──────────────────────────────────────────────┐
        │                                              │
    Y ┌──◆ PLAY ? ◆ 60                                  │
      │   │ N                                           │
      │   ▼ 62                                          │
      │ ┌───────────────┐                               │
      │ │ SET TIMER TG  │                               │
      │ │ SET TIMER TA  │                               │
      │ └───────────────┘                               │
      │   │ 64                                          │
      │ ┌───────────────────┐                           │
      │ │ SWITCH TO G       │                           │
      │ │ AND DISPLAY       │                           │
      │ │ CURRENT SCREEN    │                           │
      │ └───────────────────┘                           │
      │   │                                             │
      │   ▼ 66              68                          │
      │   ◆ PLAY ? ◆──Y──┌──────────────┐               │
      │   │ N            │ SWITCH TO A  │───────────────┤
      │   ▼ 70           └──────────────┘               │
      │ ┌─────────────────┐                             │
      │ │ DECREMENT TIMER TG│                            │
      │ └─────────────────┘                             │
      │   │                                             │
      │   ▼ 72                                          │
    N ◆ TIMER TG OUT ? ◆                                │
      │   │ Y                                           │
      │   ▼ 74                                          │
      │ ┌───────────────────┐                           │
      │ │ RESET TIMER TG    │                           │
      │ │ NEXT GRAPHICS     │                           │
      │ │ SCREEN            │                           │
      │ │ SWITCH TO A       │                           │
      │ └───────────────────┘                           │
      │   │ 76                                          │
      │   ◆ PLAY ? ◆──Y────────────────────────────────┘
      │   │ N                                          
      │   ▼ 78                                          
      │ ┌─────────────────┐                            
      │ │ DECREMENT TIMER TA│                           
      │ └─────────────────┘                            
      │   │ 80                                          
    N ◆ TIMER TA OUT ? ◆                                
      │   │ Y                                           
      │   ▼ 82                                          
      │ ┌──────────────┐                                
      └─│ RESET TIMER TA│                               
        └──────────────┘                               
```

FIG 3
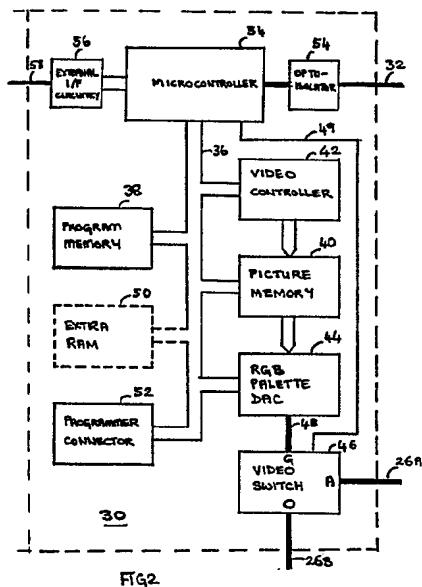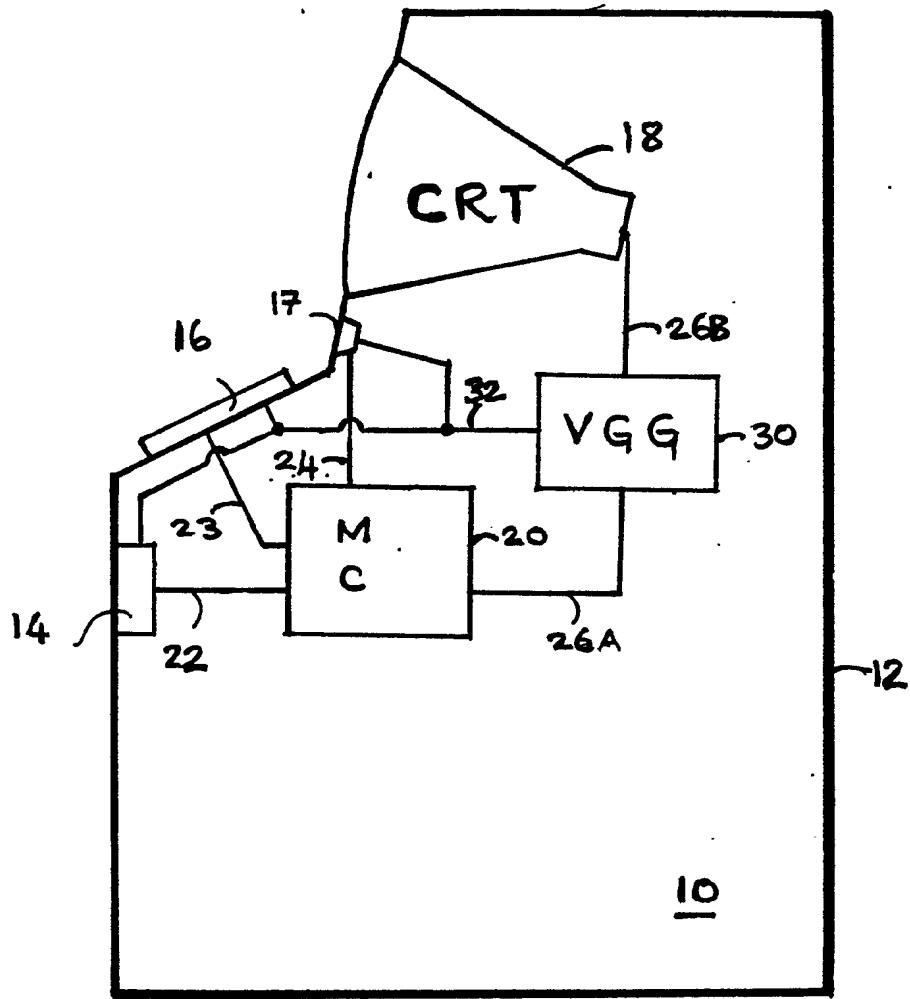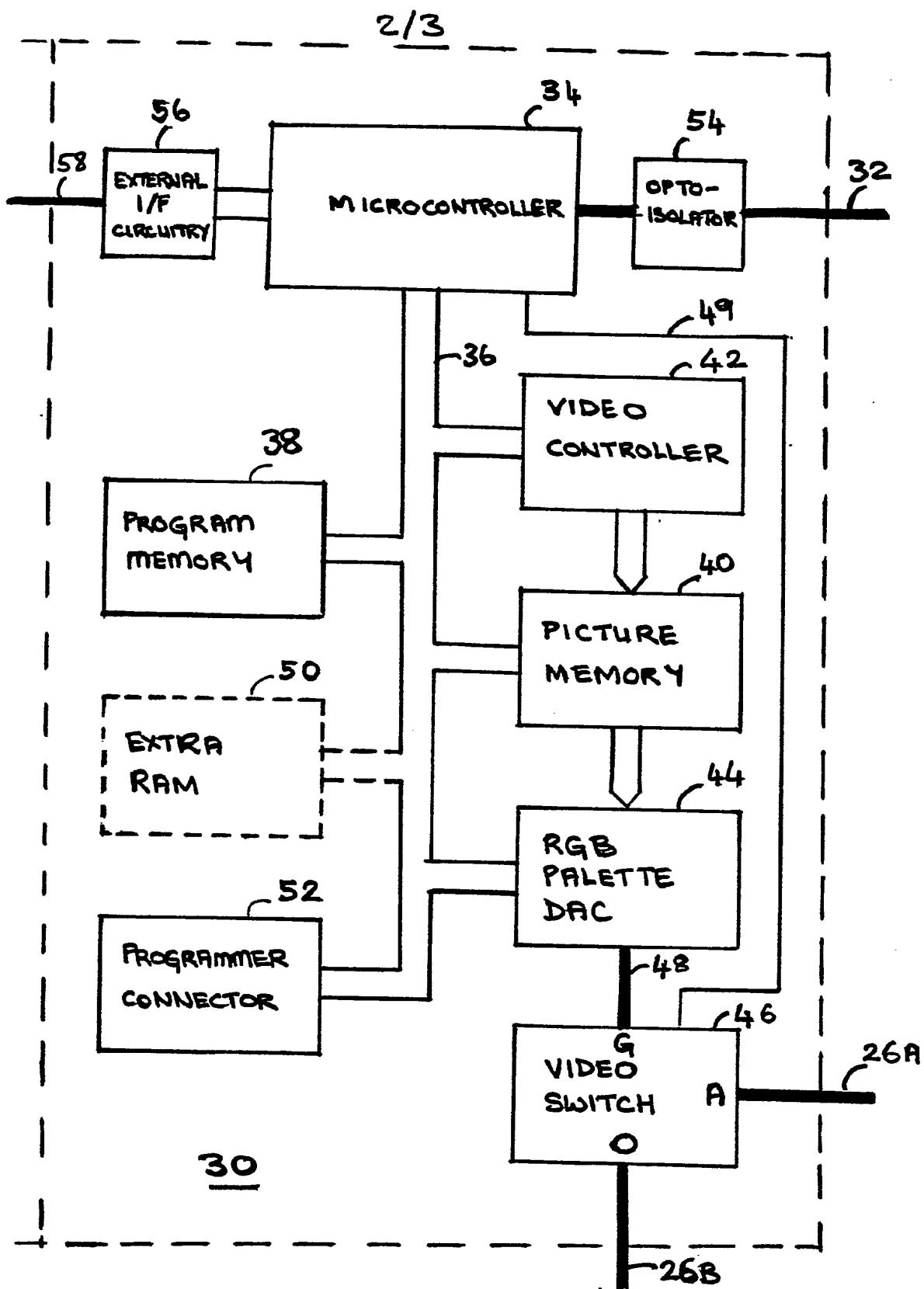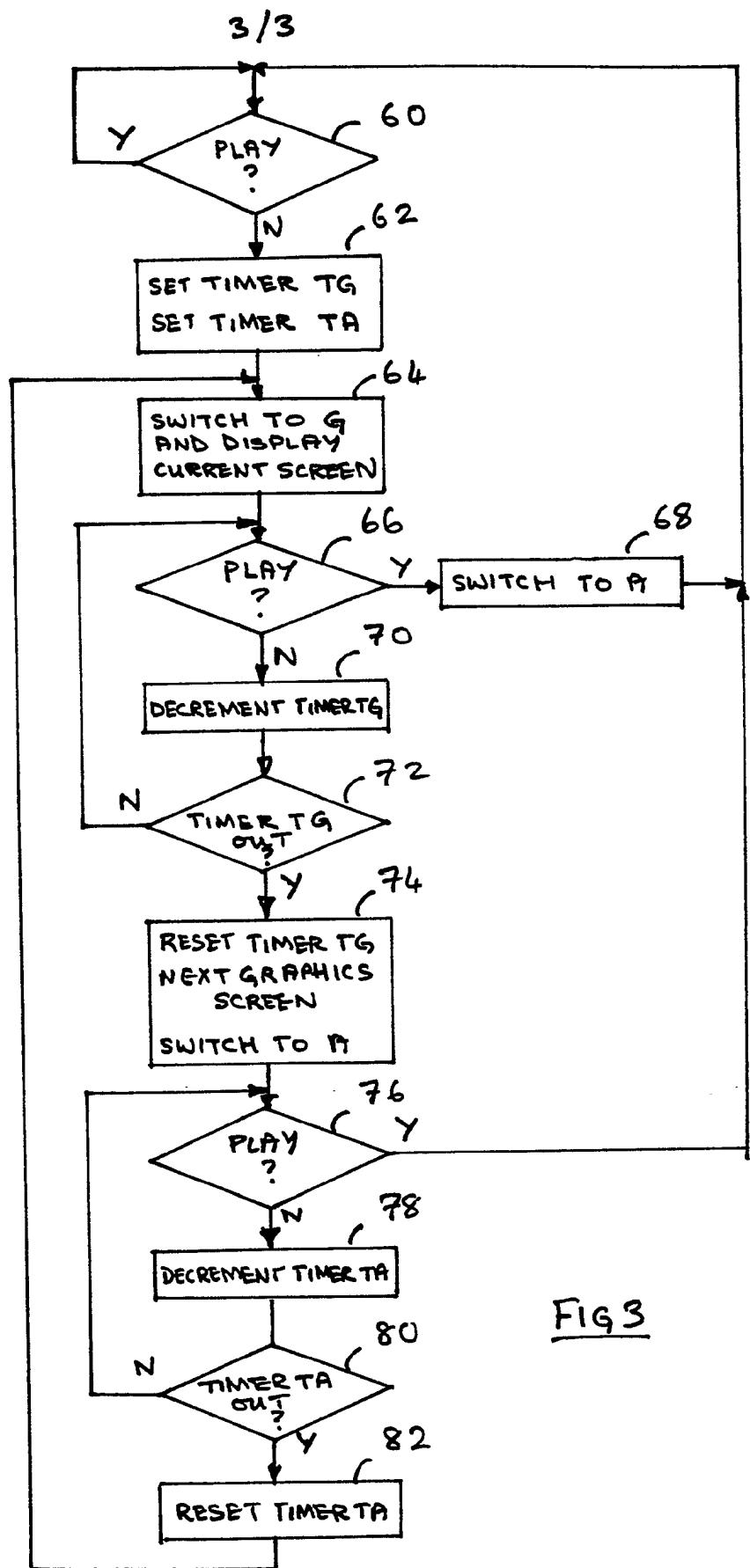
VIDEO GRAPHICS GENERATOR FOR AN AMUSEMENT MACHINE

This invention relates to a video graphics generator suitable for use with an amusement machine which is operable in a first, attract,

5 mode and a second, play, mode and which includes a video display device, user operable play select means and a machine controller operable in both the first mode and, in response to activation of the play select means, the second mode to output video signals for driving the display device.

10 Amusement machines such as video arcade games normally have two modes of operation. In one mode of operation the amusement machine is operable to play a game on payment of an appropriate amount by a user. The amusement machine is normally provided with a number of switches, levers, joysticks, track balls and the like to enable a user to

15 interact with the machine. Activation of this, play, mode is normally in response to the user inserting money or tokens into a coin or token mechanism. The play mode continues until the game has finished and/or the playtime bought by the user has run out. On termination of the play mode, the amusement machine will revert to a default, or attract,

20 mode. In the attract mode, the amusement machine normally displays pictures which will attract the user to use the machine: hence the term 'attract' mode. Typically, an amusement machine spends most of its time in the attract mode waiting for a customer.

A modern amusement machine, such as a video arcade game, is an

25 expensive piece of equipment and it is undesirable that such a piece of equipment should spend a large percentage of its time not earning money for its owner and operator. An object of the present invention is, therefore, to address this problem.

In accordance with a first aspect of the present invention, there

30 is provided a video graphics generator for an amusement machine which is operable in a first, attract, mode and a second, play, mode and which includes a video display device, user operable play select means and a machine controller operable in both the first mode and, in response to activation of the play select means, in the second mode to

35 output video signals for driving the display device, the video graphics generator comprising programmable means responsive to operation of the amusement machine in the first mode to interrupt the video signals output by the machine controller for a predetermined interval and to

substitute alternative video signals for display on the video display device during the interval.

The video graphics generator is preferably provided as an add-on unit for an existing amusement machine. It enables the usual attract
5 mode of such an amusement machine to be interrupted to permit the display of alternative video signals to those normally produced during the attract mode. These alternative video signals can be video signals forming one or more screens of one or more advertisements for products and/or services with the result that it is possible for the owner
10 and/or operator of the machine to get royalties for the display of those advertisements.

Preferably, the programmable means comprises a solid state memory means for the storage of a plurality of screens of video graphics data and control logic for selecting a screen of video data graphics data
15 from storage for generating the alternative video signals for display. A screen of video graphics data can provide a powerful advertising medium.

Preferably, the solid state memory means comprises one or more E-PROM type memories such as, for example, "flash E-PROM" memories. This
20 has the advantage that a non volatile storage can be provided for the screens of video graphics data, whilst still permitting the screens of video data to be updated as required.

Preferably, the programmable means comprises a video switch having a first video input connected, in use, to receive the video
25 signals output by the machine controller, a second video input connected, in use, to receive video signals from the solid state memory means, a video output connected, in use, to the video display device and a control input connected, in use, to receive control signals generated by the control logic for selecting the connection of the
30 first, or the second video input to the video output. Preferably, the programmable means also comprises program storage for storage of the control logic and a microcontroller under control of the control logic.

In the preferred embodiment, the control logic repeatedly interrupts the video signals from the machine controller in a first
35 mode of operation thereof, the control logic causing the display of one screen of video data per interruption but cycling the screen of video data displayed for successive interruptions, the control logic permitting the display of the video signals from the machine controller

for a predetermined period between interruptions.

The video graphics generator preferably comprises means for sensing the operational state of a payment mechanism and/or of user-operable controls and/or of indicator lights as an indication of a change of mode of operation of the amusement machine. In the case of a change from the first to the second mode of operation, the control logic causes control to be returned to the amusement machine controller.

As mentioned earlier, the video graphics generator is preferably in the form of an add-on unit for an existing amusement machine, the video graphics generator comprising a first connection means for connecting the unit to the video output of the amusement machine controller, a second connection means for connecting the unit to the amusement machine's video display device and additional connection means for sensing the operating mode of the amusement machine.

The video graphics generator can additionally be provided with means for substituting alternative audio signals for the audio signals normally output by the amusement machine during said interval in the first mode.

In accordance with the second aspect of the present invention there is provided a video graphics generator system for an amusement machine, the video graphics generator system comprising a video graphics generator as defined above and a portable programming device for programming into the video graphics generator, a plurality of screens of video graphics data for generating the alternative video signals, the video graphics generator and the portable programming device being provided with mutually cooperating transmission means for permitting the transfer of data from the portable programming device to the video graphics generator.

The invention also provides an amusement machine operable in a first, attract, mode and a second, play, mode, the amusement machine comprising a video display device, user operable play select means, a machine controller operable in both the first mode and, in response to activation of the play select means, the second mode to output video signals for driving the display device, and a video graphics generator as defined above.

A particular embodiment of the invention will be described hereinafter with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of an amusement machine incorporating a video graphics generator;

Figure 2 is a schematic block diagram of the video graphics generator of Figure 1;

5   Figure 3 is a flow diagram illustrating the operation of control logic for the video graphics generator of Figure 2.

Figure 1 is a schematic diagram of an amusement machine 10 to which a video graphics generator 30 has been added. The conventional amusement machine comprises a housing 12 with, accessible to a user externally to the machine, a coin, token, or other payment mechanism 14

10   and various game controls 16, which can include one or more of the following: switches, levers, joysticks, trackballs and the like. A machine controller 20 is connected to the payment mechanism 14 and to the user operable controls 16 by control connections 22 and 23, respectively. Each of the connections 22 and 23 can comprise one or

15   more lines as appropriate. At least one output from the machine controller 20 is in the form of a video signal which is passed via a video connection 26 to a video display device 18 (eg. a cathode ray tube with associated circuitry). Also shown is a connection 24 from

20   the machine controller 20 to an indicator light 17. It will be appreciated that a typical amusement machine has many such indicator lights, although these are not shown here for reason of clarity. Other connections, to further indicator or control lights and to an audio system, for example, can be provided. In addition, a power supply,

25   normally connected to a mains electricity supply, and appropriate wiring will be provided. These additional elements, which can be conventional, are not shown for reasons of clarity.

The video graphics generator 30 is a feature not present in conventional video based amusement machines. The video graphics

30   generator 30 is inserted in the video connection 26 between the machine controller and the video display device 18. Thus, a first connection 26A connects the video output of the machine controller to a video input of the video graphics generator 30. A second connection 26B connects the video graphics generator to the cathode ray tube 18. In

35   addition, the video graphics generator is provided with control connections 32 for sensing the operation of various elements of the amusement machine 10. In the example shown, the control connections 32 sense the operating states of the payment mechanism 14, the game

controls 16 and the indicator light 17. These control connections 32 are not present in a conventional amusement machine.

Figure 2 is a schematic block diagram of a video graphics generator 30. The video graphics generator 30 is microcontroller based. A microcontroller 34 is connected to a number of other system units via a computer bus 36. Connected to the microcontroller 34 via this bus 36 are a read only program memory 38 for the storage of control programs, an E-PROM (erasable programmable read only memory) array 40 (e.g. of flash E-PROM memory chips) forming a picture memory for the storage of a plurality of screens of video graphics data, a video controller 42 for controlling the reading of graphics data from, and the writing of graphics data to the picture memory 40, an RGB palette DAC (digital to analogue converter) 44 and an external programmer connector 52. The microcontroller 34 contains its own internal working random access memory (RAM). However, provision is made for the optional addition of extra RAM 50 to the computer bus 36. The data output from the array of E-PROMs 42 is connected to the RGB palette DAC 44, which converts the digital graphics data from the picture memory into colour signals. The output of the RGB palette DAC 44 is connected to one input, G, of a video switch 46 via a video connector line 48. The video output of the machine controller 20 is connected via the video connection 26A to the second input A of the video switch 46. The output O of the video switch 46 is connected to the video connection 26B to the cathode ray tube 18. The video switch is connected via control lines 49 to the microcontroller 34. The microcontroller 34 is linked via an opto-isolator 54 to the control connections 32 for sensing the operational state of the payment mechanism 14, the game controls 16 and the indicator lights 17 of the amusement machine. Also shown in Figure 2 is external interface circuitry 56 which can be used for reprogramming the microcontroller 34 via an external serial port 58.

The programmer 52 is used for connecting a programmer device (not shown) for programming the picture memory 42, which, as mentioned above, is used to hold a plurality of screens of graphics data. In the preferred embodiment eight screens are stored. When it is intended to programme the picture memory, an E-PROM programmer device (not shown) is plugged into the programmer connector 52. In the present embodiment of the invention the programmer connector 52 is an electrical socket,

the programmer having a co-operating plug. However, the socket could
be provided on the programmer device and the plug on the video graphics
generator 30. An optical link could alternatively be provided in other
embodiments. On insertion of the plug of the programmer device into
5   the socket 52, the microcontroller senses that the video graphics
generator is to be programmed. This causes the microcontroller to
activate a programming mode, and, in a conventional manner, data can
then can be loaded from the portable programming device into the E-PROM
array 42 under the control of the video controller 42. The video
10   graphics data for respective screens are stored at respective sets of
locations within the E-PROMs 42. The microcontroller maintains a
pointer to a current video graphics screen for display. This
operation, which is conventional in nature, is not be described further
herein. On completion of the programming operation, the programming
15   device is disconnected from the video graphics generator 30.

Figure 3 illustrates the operation of the video graphics
generator under control of control logic stored in the ROM 38. The
amusement machine 10 is operable in two different modes. The default
mode, or attract mode, is one in which the machine controller of the
20   amusement machine generates video information for display on the
cathode ray tube 18 which is intended to attract a customer to use the
amusement machine 10. In a second, play mode, which is operable after
actuation of the payment mechanism 14, the user is able to use the user
operable means 16 to interact with programs in the machine controller
25   20 to play a game.

The purpose of the video graphics generator is to interrupt the
attract mode for the display of alternative video data in the form of
graphics screens whilst ensuring that the play mode is not interrupted.
The alternative graphics screens can take the form of advertisements
30   for products or services. Figure 3 illustrates the operation of
control logic of the video graphics generator 30, the control logic
being stored in the ROM 38.

The control logic 60 tests whether a play mode has been activated
by sensing signals on the control connections 32. This test is made
35   repeatedly until the play mode ceases as detected by control signals on
the control connections 32. When the play mode ceases, the amusement
machine reverts to the default, or attract mode. On detecting this,
the control logic 62 sets a first timer, TG, and a second timer, TA.

The control logic 64 then causes the video switch to connect input G to output O. A current screen of video graphics data can then be passed via the connection 48 via the video switch 46 and the video connection 26B to the video display device 18. The screen of video graphics data to be displayed is determined by addresses supplied via the bus 36 using the pointer maintained by the microcontroller 34.

If the control logic 66 detects that a play mode has been reselected (e.g. by operation of the payment mechanism 14), the control logic 68 switches the video switch back so that the input A is connected to the output O. At this point, the screen of graphics data from the picture memory 40 ceases to be displayed, being replaced by the output from the machine controller 20. If, the control logic 66 does not detect that the play mode has been activated, the control logic 70 decrements the timer TG and then the control logic 72 tests whether the timer TG has timed out. If the control logic 72 determines that the timer TG has not counted out yet, then control reverts to the control logic 66. If the control logic 72 determines that the timer TG has timed, or counted out, this indicates that the current screen or video graphics data has been displayed for the desired length of time. In this case, the control logic 74 resets the timer TG and causes the pointer to the current graphics screen to be updated to point to the next graphics screen within the picture memory 40. The control logic 74 operates in such a manner that the video graphics generator cycles repeatedly through the screens of video graphics data stored therein. The control logic 74 then causes the video switch to switch the input A to the output O causing the display of data from the machine controller 20 on the video connection 26A to be displayed on the video display device 18 via the video connection 26B. The control logic 76 then tests whether the play mode has been activated. If the play mode has been activated, control returns to the control logic 60. If play mode has not been activated, however, the control logic 78 decrements the timer TA and then the control logic 80 tests whether the timer TA has counted out. If the timer TA has not counted out, then control returns to the control logic 76. If the control logic 80 determines that the timer TA has counted out, indicating that the attract mode has been displayed for a desired period, then the control logic 82 resets timer TA and control passes back to the control logic 64.

Thus, it can be seen that the timers TG and TA, which are

preferably implemented as counters, enable different periods to be set for the display of the video graphics screens, and the attract mode, respectively by setting appropriate initial counts in the respective counters.

5 The preferred embodiment of the invention is in the form of an add-on unit for an existing amusement machine. Accordingly, it is provided in a housing, (not shown), having attachment means (not shown) for attaching the video graphics generator at an appropriate position within the amusement machine. The control connections 32 required in

10 any specific embodiment, will depend on the specific amusement machine for which the video graphics generator is intended. These connections are to appropriate positions within the amusement machine to test the operational state of the machine. The video graphics generator is ideally provided with connectors plugs and/or sockets for providing

15 easy connection of the video graphics generator into the video connection 26. Easy access to the connector 52 for programming the picture memory 40 by means of a portable programming device can be provided. Ideally this is arranged by situating the video graphics generator at a position within the amusement machine, close to the

20 payment mechanism. Then, a service engineer, when visiting to empty the payment mechanism of any coins, can re-program the picture memory 40. Although a specific embodiment of the invention has been described, it will be appreciated that many additions and modifications are possible. For example, although in the preferred embodiment, the

25 video graphics generator is provided as an add-on unit for an existing amusement machine. it could be incorporated as an integral component in a new amusement machine.

  Although, in the present embodiment a flash E-PROM is used for the storage of the screens of video graphics data, other sorts of re-

30 programmable memory could be used. For example, a conventional RAM could be used, although in this case a battery back-up would be desirable to avoid the screens of video graphics data being erased if the power supply is interrupted.

  With the provision of a more complicated video switch, the

35 alternative video graphic images could be displayed over a part of the screens from the attract mode, rather than replacing them altogether. Alternatively, a plurality of screens of graphics data could be displayed on each interruption of the attract mode, the plurality of

screens being shown one after the other or simultaneously (e.g. at different screen positions).

The video graphics generator could additionally be provided with means for interrupting the audio output of the amusement machine. Thus, in the case of an advertisement, when a video graphics screen is displayed on the display device, this could be accompanied by the playing of a current jingle used in a corresponding television advertising campaign.

CLAIMS

1.   A video graphics generator for an amusement machine which is
operable in a first, attract, mode and a second, play, mode and which
5   includes a video display device, user operable play select means and a
machine controller operable in both the first mode and, in response to
activation of the play select means, in the second mode to output video
signals for driving the display device, the video graphics generator
comprising programmable means responsive to operation of the amusement
10   machine in the first mode to interrupt the video signals output.by the
machine controller for a predetermined interval and to substitute
alternative video signals for display on the video display device
during the interval.

15   2.   A video graphics generator as claimed in Claim 1 wherein the
programmable means comprises solid state memory for the storage of a
plurality of screens of videos graphics data, and control logic for
selecting a screen of video graphics data from storage for generating
the alternative video signals for display.
20
3.   A video graphics generator as claimed in Claim 2 wherein the
solid state memory means comprises one or more E-PROM memories.

4.   A video graphics generator as claimed in Claim 2 or Claim 3
25   wherein the programmable means comprises a video switch having a first
video input connected, in use, to receive the video signals output by
the machine controller, a second video input connected, in use, to
receive video signals from the solid state memory means, a video output
connected, in use, to the video display device and a control input
30   connected, in use, to receive control signals generated by the control
logic for selecting the connection of the first, or the second video
input to the video output.

5.   A video graphics generator as claimed in Claim 4 wherein the
35   programmable means comprises program storage for storage of the control
logic and a microcontroller under the control of the control logic.

6.   A video graphics generator as claimed in any one of Claim 2 to 5 wherein the control logic repeatedly interrupts the video signals from the machine controller in the first mode of operation thereof, the control logic causing the display of a selectable number screens of

5   video data per interruption, by cycling the screen of video data displayed for successive interruptions, the control logic permitting the display of the video signals from the machine controller for a predetermined period between interruptions.

10   7.   A video graphics generator as claimed in any preceding claim including means for sensing the operational state of a payment mechanism and/or of user operable controls and/or of indicator lights as an indication of a change of mode of operation of the amusement machine.

15

8.   A video graphics generator as claimed in any one of the preceding claims as an add-on unit for an amusement machine, the video graphics generator comprising a first connection means for connecting the unit to the video output of the amusement machine controller, a second

20   connection means for connecting the unit to the amusement machine's display device and additional connection means for sensing the operating mode of the amusement machine.

9.   A video graphics generator as claimed in any preceding claim

25   comprising means for substituting alternative audio signals for the audio signals normally output by the amusement machine during said interval in the first mode.

10.   A video graphics generator system for an amusement machine, the

30   video graphics generator system comprising a video graphics generator as claimed in any one of the preceding Claims and a portable programming device for programming into the video graphics generator, a plurality of screens of video graphics data for generating the alternative video signals, the video graphics generator and the

35   portable programming device being provided with mutually cooperating transmission means for permitting the transfer of data from the portable programming device to the video graphics generator.

11. An amusement machine operable in a first, attract, mode and a second, play mode, the amusement machine comprising a video display device, user operable play select means, a machine controller operable in both the first mode and, in response to activation of the play

5   select means, the second mode to output video signals for driving the display device and a video graphics generator as claimed in any one of Claim 1 to 9.

12. A video graphics generator substantially as hereinbefore

10 described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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9103936.2

Relevant Technical fields

(i) UK Cl (Edition   K   )   H4T (TBAG)

(ii) Int Cl (Edition   5   )   A63F

Databases (see over)

(i) UK Patent Office

(ii)

   ONLINE DATABASES: WPI

Search Examiner

P J EASTERFIELD

Date of Search

31 MAY 1991

Documents considered relevant following a search in respect of claims   1 to 11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2193868 A (NINTENDO)	
A	GB 2141907 A (GILMORE et al)	
A	GB 2106685 A (KENNEDY ET AL)	
X	GB 2091069 A (COMPUTER FIELD SUPPORT) whole document	1,7,11
A	GB 2086115 A (ACE COIN)	
X	GB 2083936 A (COIN OPERATED PARTS) see page 2 lines 23 to 33	1,7,11
X	WO 82/03318 A1 (HORAN) see page 16 line 18 to page 19 line 8	1,7,11

SF2(p)

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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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